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(12) United States Patent Jain et al.

(54) PATTERNED LAYER DESIGN FOR GROUP III NITRIDE LAYER GROWTH

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(57) ABSTRACT

A device having a layer with a patterned surface for improving the growth of semiconductor layers, such as group III nitride-based semiconductor layers with a high concentration of aluminum, is provided. The patterned surface can include a substantially flat top surface and a plurality of stress reducing regions, such as openings. The substantially flat top surface can have a root mean square roughness less than approximately 0.5 nanometers, and the stress reducing regions can have a characteristic size between approximately 0.1 microns and approximately five microns and a depth of at least 0.2 microns. A layer of group-III nitride material can be grown on the first layer and have a thickness at least twice the characteristic size of the stress reducing regions.

20 Claims, 14 Drawing Sheets



